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WO 95/06921 A1

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UK CL (Edition P) G4H HRCU
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(54) Radio display pager with prioritizing of messages

(57) A radio display pager receives an addressed paging signal containing a message which may be accompanied by a predetermined parameter such as any of various prestored telephone numbers. The pager stores 26 the message into a memory as a normal message if it is not accompanied by the parameter or stores 25 it as an important message if it is accompanied by the parameter. If the memory is full, the pager removes 33 an oldest normal message from the memory if the memory contains at least one normal message, and removes 37 an oldest important message from the memory if the memory contains only the important messages. "Confirmed" messages (read, or unread for too long) are removed 31 in preference to either.
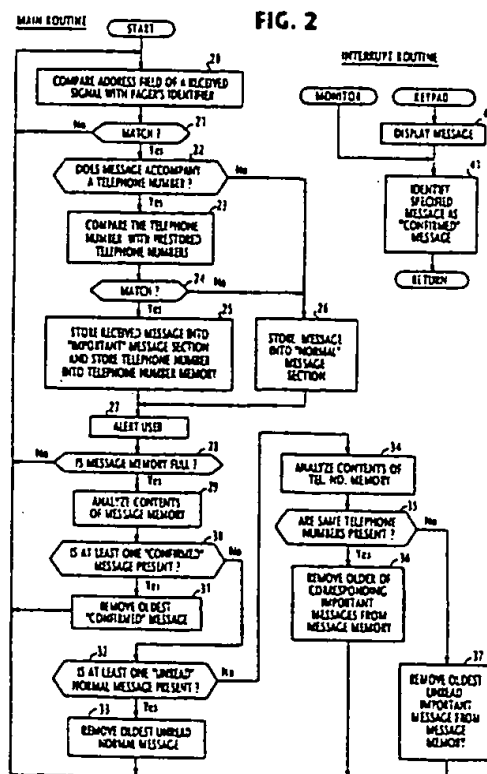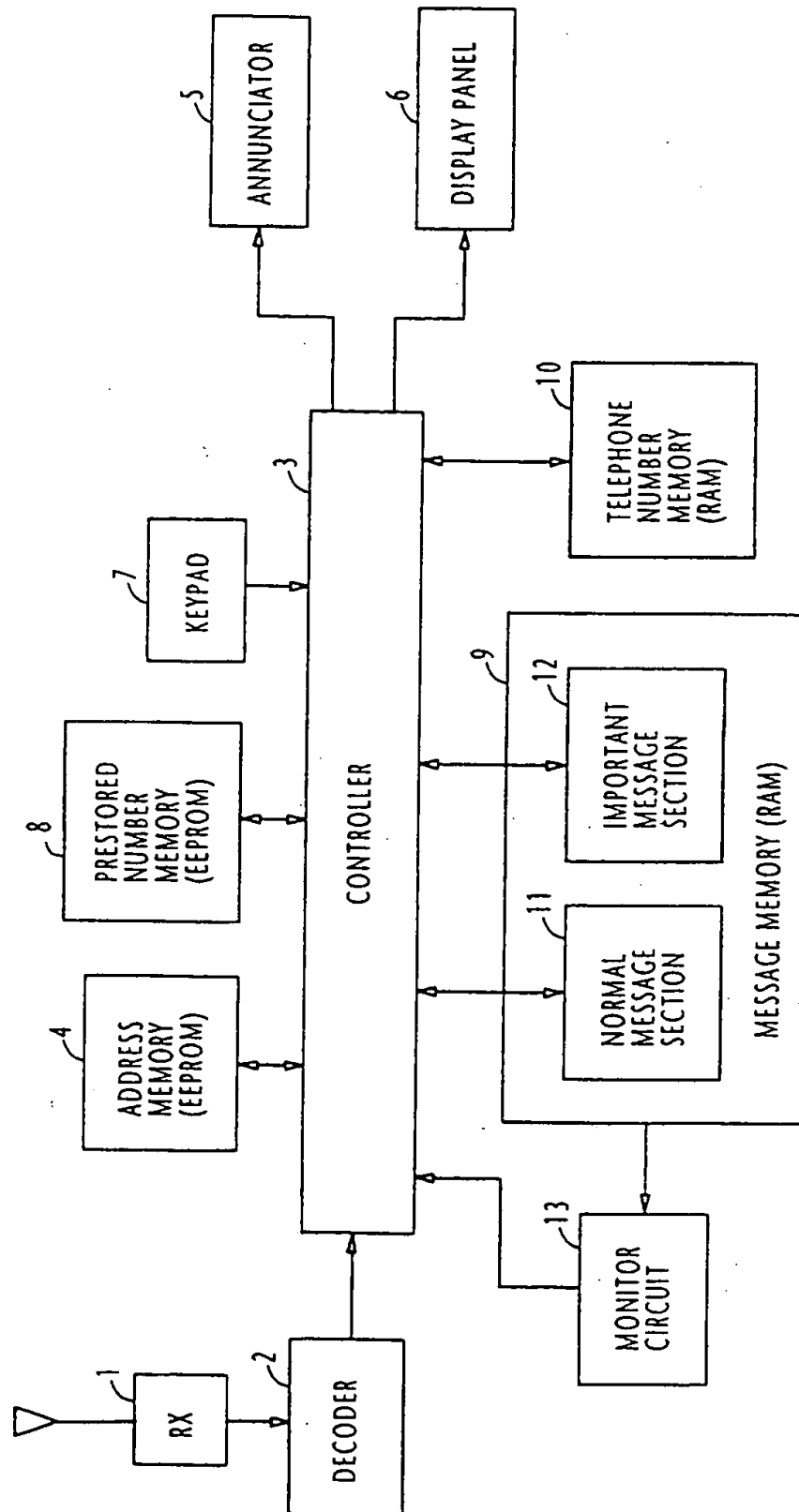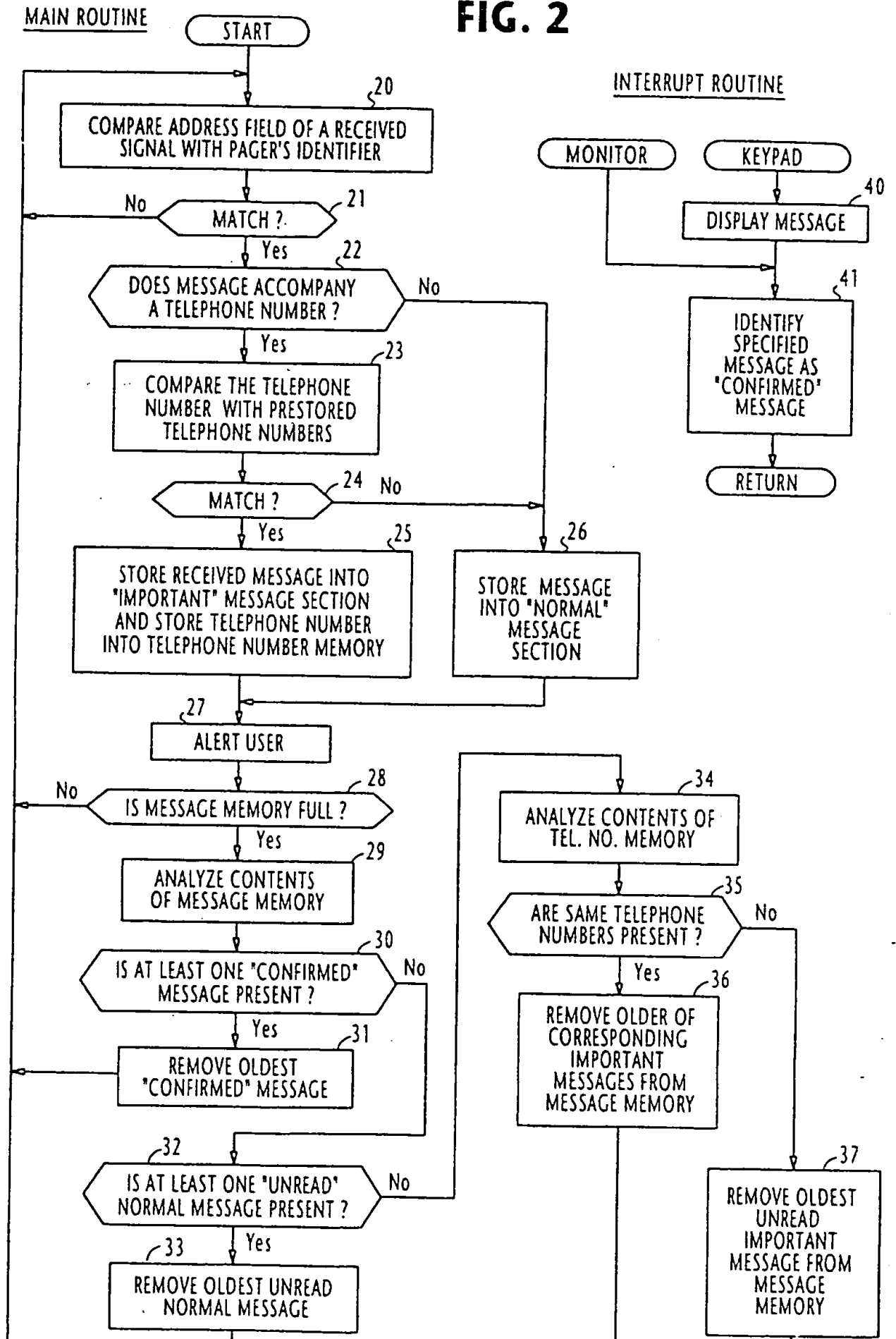

FIG. 2

FIG. 1

FIG. 2

MAIN ROUTINE

START

COMPARE ADDRESS FIELD OF A RECEIVED
SIGNAL WITH PAGER'S IDENTIFIER — 20

No ← MATCH ? — 21

Yes

DOES MESSAGE ACCOMPANY
A TELEPHONE NUMBER ? — 22 → No

Yes

COMPARE THE TELEPHONE
NUMBER WITH PRESTORED
TELEPHONE NUMBERS — 23

MATCH ? — 24 No

Yes

STORE RECEIVED MESSAGE INTO
"IMPORTANT" MESSAGE SECTION
AND STORE TELEPHONE NUMBER
INTO TELEPHONE NUMBER MEMORY — 25

STORE MESSAGE
INTO "NORMAL"
MESSAGE
SECTION — 26

ALERT USER — 27

No ← IS MESSAGE MEMORY FULL ? — 28

Yes

ANALYZE CONTENTS
OF MESSAGE MEMORY — 29

IS AT LEAST ONE "CONFIRMED"
MESSAGE PRESENT ? — 30 No

Yes

REMOVE OLDEST
"CONFIRMED" MESSAGE — 31

IS AT LEAST ONE "UNREAD"
NORMAL MESSAGE PRESENT ? — 32 No

Yes — 33

REMOVE OLDEST UNREAD
NORMAL MESSAGE

INTERRUPT ROUTINE

MONITOR   KEYPAD

DISPLAY MESSAGE — 40

IDENTIFY
SPECIFIED
MESSAGE AS
"CONFIRMED"
MESSAGE — 41

RETURN

ANALYZE CONTENTS OF
TEL. NO. MEMORY — 34

ARE SAME TELEPHONE
NUMBERS PRESENT ? — 35 No

Yes — 36

REMOVE OLDER OF
CORRESPONDING
IMPORTANT
MESSAGES FROM
MESSAGE MEMORY

REMOVE OLDEST
UNREAD
IMPORTANT
MESSAGE FROM
MESSAGE
MEMORY — 37

1 <u>TITLE OF THE INVENTION</u>

2 "Radio Display Pager with Controller for Prioritized Message

3 Management"

4 <u>BACKGROUND OF THE INVENTION</u>

5 <u>Field of the Invention</u>

6 The present invention relates generally to radio display pagers, and

7 more specifically to the management of received messages stored in a radio

8 display pager.

9 <u>Description of the Related Art</u>

10 Japanese Laid-Open Patent Specification Hei-3-245621 discloses a

11 radio display pager having a message memory in which received messages

12 are successively stored in a memory to allow the user to read them at user's

13 convenient time. In order to prevent old messages from being

14 automatically removed from the memory due to user's carelessness, the

15 memory is constantly monitored and its remaining capacity is determined.

16 When the remaining capacity becomes lower than a predetermined value,

17 the user is alerted to divert his attention to the received messages.

18 However, if the pager is left unattended, the memory will be

19 overloaded and old messages will be automatically removed from the

20 memory regardless of their urgency.

21 <u>SUMMARY OF THE INVENTION</u>

22 It is therefore an object of the present invention to provide a radio

23 display pager which protects important or urgent messages by removing a

24 normal message from a memory prior to removal of important messages

25 when the memory is full.

26 According to the present invention, a radio pager receives an

27 addressed paging signal containing a message which may be accompanied

28 by a predetermined parameter and stores the message into a memory as a

29 normal message if the message is not accompanied by the predetermined

30 parameter or stores it as an important message if it is accompanied by the

1 predetermined parameter. If the memory is full, the pager removes an
2 oldest normal message from the memory if the memory contains at least
3 one normal message, and removes an oldest important message from the
4 memory if the memory contains only the important messages.

5   According to a specific aspect, the pager of the present invention
6 identifies any one of the stored normal and important messages as a
7 confirmed message when such a message is read by a user, or monitors time
8 lapse of each of the stored normal and important messages which are unread
9 by a user, and identifies one of the messages as a confirmed message when
10 the time lapse of the one stored message exceeds a predetermined value.
11 The pager removes an oldest confirmed message from the memory if the
12 memory contains at least one confirmed message, removes an oldest of the
13 normal messages which are unread by the user if the memory contains at
14 least one unread normal message, and removes an older one of important
15 messages from the memory if the memory contains only the important
16 messages which are accompanied by same predetermined parameters. The
17 pager further removes an oldest unread important message from the
18 memory if the memory contains only the important messages which are not
19 accompanied by the same predetermined parameters.

20   <u>BRIEF DESCRIPTION OF THE DRAWINGS</u>

21   The present invention will be described in further detail with
22 reference to the accompanying drawings, in which:

23   Fig. 1 is a block diagram of a radio display pager according to the
24 present invention; and

25   Fig. 2 is a flowchart of the operation of the controller of the radio
26 display pager.

27   <u>DETAILED DESCRIPTION</u>

28   As shown in Fig. 1, the radio display pager of the present invention
29 comprises a radio receiver 1 for receiving paging signals transmitted in a
30 sequence of successive frames each containing a synchronization field, an

1   address field for indicating a destination pager's identifier, and a data field

2   containing a message or a message and a caller's telephone number (or

3   caller's personal or organizational name) combined. The signals contained

4   in the address and data fields are encoded at the transmit site into a special

5   code that allows transmission errors to be corrected at the receive site. The

6   decoder 2, connected to the output of the receiver 1, provides decoding of

7   the coded signals and the original signals recovered by the decoder are fed

8   to a controller 3, where the identifier contained in the address field is

9   compared with the pager's identifier pre-stored in an address memory or

10   EEPROM (electrically erasable programmable read only memory) 4. If

11   they match, controller 3 activates an annunciator 5. The contents of the

12   data field are stored and then displayed on a display panel 6 when the

13   pager's user operates a key on a keypad 7.

14   According to the present invention, the pager includes a pre-stored

15   number memory 8, implemented with an EEPROM, is provided for storing

16   telephone numbers of important persons or organizations. In addition, the

17   pager has a message memory 9 and a telephone number 10, both of which

18   are implemented with a random access memory. The message memory 9 is

19   divided into a normal message section 11 for storing messages not

20   accompanied by a telephone number and an important message section 12

21   for storing important messages that are accompanied by a telephone

22   number. These telephone numbers are stored in the telephone number

23   memory 10. A monitor circuit 13 is further connected to the message

24   memory 9 to monitor the time lapse of each of unread stored message and

25   informs the controller 3 of a message when its time lapse exceeds a

26   predetermined value. Controller 3 responds to the output of monitor

27   circuit 13 by invoking an interrupt routine.

28   The operation of the controller 3 will be discussed hereinbelow with

29   reference to the flowchart of Fig. 2. As illustrated, the controller normally

30   executes a main routine by processing a decoded paging signal to store a

1 received message. The controller operates an interrupt routine when the

2 user operates the keypad to read the stored message at the time the user is

3 alerted or at a later time convenient for the user or when the monitor circuit

4 13 produces an output.

5 The main routine begins with decision step 20 to compare the

6 address field of a received paging signal with the pager's identifier. If they

7 match (step 21), flow proceeds to decision step 22 determine whether a

8 message contained in the data field of the received signal is accompanied by

9 a telephone number. If so, flow proceeds from step 22 to step 23 to

10 compare the telephone number with the telephone numbers stored in the

11 pre-stored number memory 8. If the telephone number matches one of the

12 pre-stored telephone numbers (step 24), it is determined that the message in

13 the data field is an important message, and flow proceeds to step 25 to store

14 the message into the important message section 12 of message memory 9

15 and the telephone number into the telephone number memory 10. If the

16 message is not accompanied by a telephone number (step 22), or if the

17 telephone number does not match a pre-stored one (step 24), flow proceeds

18 to step 26 to store the message into the normal message section 11 of

19 message memory 9.

20 Therefore, only those messages that are accompanied by one of a

21 group of predetermined telephone numbers are stored as important

22 messages. Those messages which are not accompanied by a telephone

23 number or accompanied by a telephone number not belonging to the group

24 of predetermined ones are stored as normal messages.

25 Following the execution of step 25 or 26, the annunciator 5 is

26 activated (step 27) to alert the user. Controller 3 proceeds to decision step

27 28 to check to see if the message memory 9 is full. If not, flow returns to

28 the starting point of the main routine to repeat the above process to ready

29 for the reception of subsequent messages.

30 Meanwhile, the user may operate the keypad 7 to read a stored

1 message. This invokes the interrupt routine by displaying the stored

2 message (step 40). At step 41, controller 3 changes the identification of the

3 displayed message to a "confirmed" message, regardless of whether it is

4 stored as a normal or an important message. If the displayed message is an

5 important message, it is relocated from the important message section 12 to

6 the normal message section 11 and marked "confirmed". If the displayed

7 message is a normal message, it is only marked "confirmed". Controller 3

8 then returns to the main routine.

9   When the time lapse of an unread normal or important message

10 execeeds a predetermined time-out period, an interrupt routine is invoked

11 by monitor circuit 13. In response, controller 3 proceeds to step 41 to

12 change the identification of the specified message to a "confirmed"

13 message.

14   If the message memory 9 is full (step 28), flow proceeds to step 29

15 to analyze the contents of message memory 9. At step 30, the controller

16 determines whether the message memory 9 contains at least one

17 "confirmed" message. If this is the case, the controller proceeds from step

18 30 to step 31 to remove the oldest "confirmed message and returns to the

19 starting point of the main routine. If the decision at step 30 is negative,

20 flow proceeds to step 32 to check to see if there is at least one "unread"

21 normal message in the message memory. If so, flow proceeds from step 32

22 to step 33 to remove the oldest "unread" normal message and returns to

23 step 20.

24   If the decision at step 32 is negative, the full message memory 9

25 indicates that it contains only important messages, and flow proceeds to

26 step 34 to analyze the contents of the telephone number memory 10. At

27 step 35, the controller determines whether mutually identical telephone

28 numbers are present. If the decision is affirmative at step 35, flow proceeds

29 to step 36 to remove, from the message memory, the older one of

30 important messages that correspond to the mutually identical telephone

numbers, and returns to step 20. If the decision at step 35 is negative, the oldest unread important message is removed from the message memory (step 37), and flow returns to step 20.

Each feature disclosed in this specification (which term includes the claims) and/or shown in the drawings may be incorporated in the invention independently of other disclosed and/or illustrated features.

What is claimed is:

1.   A radio pager for receiving a paging signal addressed to the
pager, said paging signal containing a message which may be accompanied
by a predetermined parameter, comprising:
    a memory; and
    control circuitry for storing said message into the memory as a
normal message if the message is not accompanied by said predetermined
parameter or as an important message if the message is accompanied by said
predetermined parameter, removing an oldest one of the normal messages
from the memory if the memory is full containing at least one said normal
message, and removing an oldest one of the important messages from the
memory if the memory is full containing only said important messages.

2.   A radio pager as claimed in claim 1, wherein said control
circuitry is arranged to further remove, from the memory, an older one of
said important messages which are accompanied by mutually identical
predetermined parameters if the memory is full containing only said
important messages.

3.   A radio pager as claimed in claim 1, wherein said control
circuitry is arranged to remove said oldest important message from the
memory if said important messages are not accompanied by mutually
identical predetermined parameters, and remove an older one of the
important messages from the memory if the important messages are
accompanied by the mutually identical predetermined parameters.

4.   A radio pager as claimed in claim 1, wherein said control
circuitry is arranged to:
    identify any one of the stored normal and important messages as a
confirmed message when said any one message is read by a user;

5   remove an oldest one of the confirmed messages from the memory
6   if the memory contains at least one said confirmed message; and
7   remove an oldest one of the normal messages which are unread by
8   the user if the memory contains at least one said unread normal message,
9   remove an older one of the important messages from the memory if
10 the memory contains only said important messages which are accompanied
11 by the mutually identical predetermined parameters; and
12   remove an oldest one of the important messages which are unread
13 by the user from the memory if the memory contains only said important
14 messages which are not accompanied by the mutually identical
15 predetermined parameters.

1   5.   A radio pager as claimed in claim 1, wherein said control
2   circuitry is arranged to:
3   monitor time lapse of each of the stored normal and important
4   messages which are unread by a user;
5   identify one of the stored messages as a confirmed message when
6   the time lapse of said one stored message exceeds a predetermined value;
7   remove an oldest one of the confirmed messages from the memory
8   if the memory contains at least one said confirmed message;
9   remove an oldest one of the normal messages which are unread by
10 the user if the memory contains at least one said unread normal message,
11   remove an older one of the important messages from the memory if
12 the memory contains only said important messages which are accompanied
13 by the mutually identical predetermined parameters; and
14   remove an oldest one of the important messages which are unread
15 by the user from the memory if the memory contains only said important
16 messages which are not accompanied by the mutually identical
17 predetermined parameters.

1   6.   A radio pager as claimed in claim 1, wherein said control
2 circuitry is arranged to:

3   identify any one of the stored normal and important messages as a
4 confirmed message when said any one message is read by a user;

5   monitor time lapse of each of the stored normal and important
6 messages which are unread by a user;

7   identify one of the stored messages as said confirmed message when
8 the time lapse of said one stored message exceeds a predetermined value;

9   remove an oldest one of the confirmed messages from the memory
10 if the memory contains at least one said confirmed message;

11   remove an oldest one of the normal messages which are unread by
12 the user if the memory contains at least one said unread normal message,

13   remove an older one of the important messages from the memory if
14 the memory contains only said important messages which are accompanied
15 by mutually identical predetermined parameters; and

16   remove an oldest one of the important messages which are unread
17 by the user from the memory if the memory contains only said important
18 messages which are not accompanied by the mutually identical
19 predetermined parameters.

1   7.   A radio pager as claimed in claim 1, wherein said control
2 circuitry is arranged to:

3   compare a parameter accompanying a message with a pre-stored
4 parameter; and

5   write the message into the memory as said important message if the
6 accompanying parameter coincides with the pre-stored parameter.

1   8.   A radio pager as claimed in any one of the preceding claims,
2 wherein said parameter is one of a telephone number, a personal name and
3 an organizational name.

1   9.   A message management method for a radio pager which

2 receives a paging signal addressed to the pager, said paging signal containing

3 a message which may be accompanied by a predetermined parameter,

4 comprising the steps of:

5   a)   storing said message into a memory as a normal message if the

6 message is not accompanied by said predetermined parameter or storing the

7 message into the memory as an important message if the message is

8 accompanied by said predetermined parameter;

9   b)   determining whether or not the memory is full;

10   c)   if the memory is not full, repeating the steps (a) and (b); and

11   d)   if the memory is full, removing an oldest one of the normal

12 messages from the memory if the memory contains at least one said normal

13 message, and removing an oldest one of the important messages from the

14 memory if the memory contains only said important messages.

1   10.   The method of claim 9, wherein the step (d) further

2 comprises the step of removing, from the memory, an older one of said

3 important messages which are accompanied by mutually identical

4 predetermined parameters.

1   11.   The method of claim 9, wherein the step (d) comprises the

2 steps of:

3   removing said oldest important message from the memory if said

4 important messages are not accompanied by mutually identical

5 predetermined parameters; and

6   removing an older one of the important messages from the memory

7 if the important messages are accompanied by the mutually identical

8 predetermined parameters.

1   12.   The method of claim 9, further comprising the step of

2 identifying any one of the stored normal and important messages as a

3 confirmed message when said any one message is read by a user,

4   wherein the step (d) comprises the steps of:

5   removing an oldest one of the confirmed messages from the

6 memory if the memory contains at least one said confirmed message;

7   removing an oldest one of the normal messages which are unread by

8 the user if the memory contains at least one said unread normal message;

9   removing an older one of the important messages from the memory

10 if the memory contains only said important messages which are

11 accompanied by the mutually identical predetermined parameters; and

12   removing an oldest one of the important messages which are unread

13 by the user from the memory if the memory contains only said important

14 messages which are not accompanied by the mutually identical

15 predetermined parameters.

1   13.   The method of claim 9, further comprising the steps of

2 monitoring time lapse of each of the stored normal and important messages

3 which are unread by a user and identifying one of the messages as a

4 confirmed message when the time lapse of said one stored message exceeds

5 a predetermined value,

6   wherein the step (d) comprises the steps of:

7   removing an oldest one of the confirmed messages from the

8 memory if the memory contains at least one said confirmed message; -

9   removing an oldest one of the normal messages which are unread by

10 the user if the memory contains at least one said unread normal message;

11   removing an older one of the important messages from the memory

12 if the memory contains only said important messages which are

13 accompanied by the mutually identical predetermined parameters; and

14   removing an oldest one of the important messages which are unread

15 by the user from the memory if the memory contains only said important

16 messages which are not accompanied by the mutually identical

17 predetermined parameters.

1   14.   The method of claim 9, further comprising the steps of:

2   identifying any one of the stored normal and important messages as

3 a confirmed message when said any one message is read by a user;

4   monitoring time lapse of each of the stored normal and important

5 messages which are unread by a user; and

6   identifying one of the messages as said confirmed message when the

7 time lapse of said one stored message exceeds a predetermined value,

8   wherein the step (d) comprises the steps of:

9   removing an oldest one of the confirmed messages from the

10 memory if the memory contains at least one said confirmed message;

11   removing an oldest one of the normal messages which are unread by

12 the user if the memory contains at least one said unread normal message;

13   removing an older one of the important messages from the memory

14 if the memory contains only said important messages which are

15 accompanied by mutually identical predetermined parameters; and

16   removing an oldest one of the important messages which are unread

17 by the user from the memory if the memory contains only said important

18 messages which are not accompanied by the mutually identical

19 predetermined parameters.

1   15.   The method of claim 9, wherein the step (a) comprises the

2 steps of:

3   comparing a parameter accompanying a message with a pre-stored

4 parameter; and

5   storing the message into the memory as said important message if

6 the accompanying parameter coincides with the pre-stored parameter.

1   16.   The method of any of the preceding claims, wherein said

parameter is one of a telephone number, a personal name and an organizational name.

17.   A radio pager or a message management method substantially as herein described with reference to the accompanying drawings.

The Patent Office

14

Application No: GB 9726881.7	**Examiner:** Mike Davis
Claims searched: 1-17	**Date of search:** 4 March 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

    UK Cl (Ed.P): G4H (HRCU)

    Int Cl (Ed.6): G08B

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	WO 95/06921 A1 (MOTOROLA)	1,9 at least

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